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RESEARCH ARTICLE

First record of the alien mantid *Hierodula tenuidentata* (Insecta: Mantodea) in Romania

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Abstract

Hierodula tenuidentata is reported for the first time in Romania, from several places, with strong evidence on the existence of stable populations in this country. Preliminary data regarding the ecology of the species and its relations with indigenous fauna are presented, as well as differences between this species and its closest congeners from Romania and Europe.

Keywords

Allochthonous, citizen science, Europe, invasive, praying mantis, ootheca, range expansion.

Introduction

Many allochthonous species are prone to become invasive, which represents the second most important threat (after habitat loss) to biodiversity (Mckinney and Lockwood 1999). Considering this, it is critical to quickly detect the new allochthonous species

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in order to correctly assess their potential impact on native fauna and flora, and to take the necessary actions against it. This task can be accomplished partially via citizen science projects, where people interested in wildlife collect data regarding various species and send it to specialists for utilization (see for example Schade et al. 2019). This was successfully applied on praying mantises (Battison et al. 2020a, 2020b; Moulin 2020) as the number of alien mantodeans species increased in Europe in the last two decades (Schwarz and Ehrmann 2018). While some species just extended (more or less naturally) their native ranges, some of them arrived on the continent only due to human transportation activities, either incidentally or brought here by insect breeders (Schwarz and Ehrmann 2018). *Hierodula tenuidentata* Saussure, 1869 is probably an example of transportation as hitchhiking individuals were observed (Moulin 2020). Moreover, although it was recorded in Crimea a century ago, it spread in other areas of Europe only recently as trade intensified. *H. tenuidentata* was originally known to be distributed from India to Central Asia, but the recent synonymy with *Hierodula transcaucasica* Brunner von Wattenwyl, 1878 extended its distribution area as far as the Caucasus region (Battiston et al. 2018).

In Romania, four praying mantis species were known until now: *Mantis religiosa* (Linnaeus, 1758), *Empusa fasciata* (Brullé, 1832), *Ameles heldreichi* (Brunner von Wattenwyl, 1882) and *Iris oratoria* (Linnaeus, 1758) (Cazacu 2019). In this paper, we provide the first Romanian records of *H. tenuidentata*, current distribution and ecological data are discussed as well, improving our understanding on Romanian Mantodea.

Methods

Data concerning the presence of *Hierodula tenuidentata* in Romania were collected both from field surveys and with the help of citizen science, from pictures of oothecae and adult specimens posted on social media (Facebook). The data from social media was collected by request posts and opportunistic records encountered by the auteurs online, but the majority of the data came from a group dedicated to observations of insects from Romania, were all the information posted regarding *Mantis* and *Hierodula* was checked and reviewed. Three collected specimens are stored in the private collection of Alexandru-Mihai Pintilioaie and Ioan-Alexandru Rădac. Another two specimens (one from Timișoara and one from Sfântu Gheorghe) were deposited in the collection of Grigore Antipa National Museum of Natural History (Romania), as voucher specimens, together with one ootheca. In order to assess the population size, data on specimen remains encountered in nature were also taken into consideration, and we counted the right foreleg or forewing as one individual. In order to rear possible parasitoids and scavengers of adults, 20 dead specimens found in nature after the first autumn frost in Timișoara (Timiș county) were kept in containers at room conditions and checked regularly for the emerging adults.

Data regarding the oothecae, such as substrate on which they were laid, the height from the ground and the general orientation were analyzed to see if there is any preference for egg laying. We also gathered photographic material of *Mantis religiosa* oothecae as they resemble very closely those of *Hierodula*, in order to prevent misidentifications in the citizen science surveys and to observe and describe the differences with *Hierodula tenuidentata*.

In order to assess the viability of oothecae of *Hierodula tenuidentata* and rear possible parasitoids of the eggs, 20 oothecae were collected (ten that were mainly hatched and ten that were un-hatched), kept in a plastic container and sprayed with water weekly. The oothecae were kept at room conditions and the container was checked regularly for the emerging nymphs or adults parasitoids and scavengers.

The photographs of adults, oothecae and identification characters were taken with a Nikon 5300 camera equipped with Sigma 105mm f/2.8 macro lens. Image processing was performed with Kitra 4.2.8 and Inkscape 0.92 software.

Results

Observations (both from field and via citizen science) for *Hierodula tenuidentata* and *Mantis religiosa* from Romania are presented below:

Material examined (adults and nymphs):

***Hierodula tenuidentata* (55 adults ♀♀, 1 nymph):** Romania: Constanța county: 1 ♀, Agigea: Marine Biological Station "Prof. Dr. Ioan Borcea" (44.0876°N/28.6413°E), 06.11.2019, leg. Spaseni Petronel and Ana Jurjescu; 1 ♀, Agigea: Marine Biological Station "Prof. Dr. Ioan Borcea" (44.0888°N/28.6416°E), 28.08.2020, leg. Ana Jurjescu, Beti Filote and Vlad Amarghioalei; Ialomița county: 1 ♀, Slobozia (44.5667°N/27.3587°E), 10.10.2020, observed by Alina Florina; Ilfov county: 1 ♀, București: Orășelul Copiilor Park (44.4001°N/26.1085°E), 10.09.2019, observed by Adrian Roman; 1 ♀, București: Aviației (44.4780°N/26.0948°E), 9.09.2020, observed by Dana Milea and Mihai Zachi; 1 ♀, Tamași (44.5842°N/26.0054°E), 07.09.2019, observed by Andreea Dumitraș; Timiș county: 1 ♀, Cerneteaz (45.8472°N/21.2597°E), 26.10.2020, observed by Alexandru Avrămescu; 46 ♀♀, Timișoara: Central Park and Cathedral Park (45.7502°N/21.2234°E), 15.10.2019, leg. Ioan-Alexandru Rădac; Tulcea county: 1 ♀, Sfântu Gheorghe (44.8966°N/29.5936°E), 07.2019, leg. Tudor Dumitrașcu; 1 ♀, Sfântu Gheorghe (44.8927°N/29.5985°E), 4.10.2020, leg. Viorel Dumitru Gavril; 1 nymph, Sulina (45.1444°N/29.6844°E), 3.08.2020, observed by Ciprian Mihai.

Material examined (oothecae):

***Hierodula tenuidentata* (146 specimens):** Romania: Călărași county: 4 oothecae (3 on *Crataegus* sp. and 1 on *Prunus* sp.), Lehliu Gară (44.4508°N/26.8477°E), 27.02.2021, observed by Carol Androne; 1 ootheca on *Ribes* sp., Lehliu Gară (44.4327°N/26.8552°E), 28.02.2021, observed by Carol Androne; Constanța county: 3 oothecae, Agigea: Marine Biological Station "Prof. Dr. Ioan Borcea" (44.0888°N/28.6416°E), 10.02.2021, leg. Cătălin Răzvan Stanciu and Cosmin Ovidiu Manci; Ilfov county: 1 ootheca on twigs, București: Vatra Nouă (44.5018°N/26.0546°E), 3.08.2020, observed by Hanna Hanuman; 1 ootheca on twigs, București: Tineretului Park (44.4066°N/26.1088°E), 26.02.2021, observed by Alexandru Niță; Timiș county: 1 ootheca on *Acer* sp., Timișoara: Cathedral Park (45.7498°N/21.2233°E), 12.10.2018, observed by Ioan-Alexandru Rădac; 135 oothecae (117 laid in 2019 and 18 probably laid in 2018) on trunks and twigs of *Platanus* sp., *Ulmus montana* var. *pendula* Loudon, *Tilia platyphyllos* Scop., *Aesculus hippocastanum* L., *Juglans nigra* L., *Robinia pseudoacaia* L. and *Styphnolobium japonicum* (L.) Schott, Timișoara, Central Park and Cathedral Park (45.7498°N/21.2233°E), 15.10.2019, leg. Ioan-Alexandru Rădac.

***Mantis religiosa* (55 specimens):** Romania: Arad county: 1 ootheca on herbaceous plant, Arad (46.2069°N/21.2684°E), 22.03.2020, observed by Andreea Lavinia Onuță; 1 ootheca on herbaceous plant, Hălăliș (46.0047°N/22.2063°E), 21.03.2019, observed by Alexandru-Mihai Pintilioaie; 1 ootheca on herbaceous plant, Săvârșin (46.0083°N/22.2176°E), 20.03.2020, leg. Alexandru-Mihai Pintilioaie; Bacău county: 1 ootheca on herbaceous plant, Comănești (46.4276°N/26.4410°E), 09.04.2010, observed by Alexandru-Mihai Pintilioaie; 1 ootheca on herbaceous plant, Comănești (46.4289°N/26.4370°E), 14.02.2016, observed by Alexandru-Mihai Pintilioaie; 1 ootheca on herbaceous plant, Comănești (46.4332°N/26.4323°E), 26.02.2021, observed by Alexandru-Mihai Pintilioaie; 1 ootheca on herbaceous plant, Comănești (46.4315°N/26.4355°E), 2.03.2021, observed by Alexandru-Mihai Pintilioaie; Bihor county: 1 ootheca on herbaceous plant, Poienița (47.2979°N/23.3292°E), 10.10.2020, leg. Ioan-Alexandru Rădac; Brașov county: 1 ootheca on herbaceous plant, Rupea (46.0440°N/25.2214°E), 08.04.2018, observed by Dana Milea and Mihai Zachi; Buzău county: 1 ootheca on herbaceous plant, Berca (45.2845°N/26.6923°E), 08.03.2020, observed by Gelu Mălureanu; Caraș-Severin county: 1 ootheca on stone, Reșița (45.2789°N/21.8990°E), 13.03.2020, observed by Liviu Drăghici; 1 ootheca on asbestos sheet, Reșița (45.3311°N/21.8795°E), 26.05.2020, observed by Liviu Drăghici; 4 oothecae on metal pole, Reșița (45.3314°N/21.8789°E), 17.12.2020, observed by Liviu Drăghici; Cluj county: 1 ootheca on herbaceous plant, Cluj-Napoca (46.7646°N/23.5926°E), 23.10.2017, observed by Alexandru Cătălin; Constanța county: 1 ootheca on herbaceous plant, Agigea: Marine Biological Station "Prof. Dr. Ioan Borcea" (44.0892°N/28.6414°E), 05.03.2019, leg. Alexandru-Mihai Pintilioaie; Dâmbovița county: 1 ootheca on herbaceous plant, Ungureni (44.8606°N/25.3747°E), 19.04.2019, observed by Maximilian Teodorescu;

Hunedoara county: 1 ootheca on herbaceous plant, Ilia (45.9416°N/22.6389°E), 24.04.2020, leg. Alexandru-Mihai Pintilioaie; 1 ootheca on a piece of tile, Șoimuș (45.9027°N/22.8869°E), 16.03.2020, leg. Alexandru-Mihai Pintilioaie; 2 oothecae on concrete fence, Vaidei (45.8673°N/23.3013°E), 20.11.2018, leg. Ioan-Alexandru Rădac; 1 ootheca on herbaceous plant, Vețel (45.9095°N/22.8086°E), 26.03.2019, observed by Alexandru-Mihai Pintilioaie; Iași county: 1 ootheca on herbaceous plant, Breazu (47.2135°N/27.5254°E), 14.03.2020, observed by Adriana Postolache; 1 ootheca on herbaceous plant, Vânători (47.2428°N/27.4967°E), 20.03.2016, observed by Alexandru-Mihai Pintilioaie; 1 ootheca on herbaceous plant, Valea Lupului (Valea lui David natural reserve) (47.1982°N/27.4670°E), 18.03.2019, observed by Lucian Hănceanu; 5 oothecae on herbaceous plants, Valea Lupului (Valea lui David natural reserve) (47.1964°N/27.4681°E), 12.02.2020, leg. Alexandru-Mihai Pintilioaie; 1 ootheca on herbaceous plant, Valea Lupului (Valea lui David natural reserve) (47.1999°N/27.4674°E), 15.03.2020, leg. Alexandru-Mihai Pintilioaie; 9 oothecae on herbaceous plants, Valea Lupului (Valea lui David natural reserve) (47.1959°N/27.4679°E), 2.03.2021, leg. Lucian Hănceanu; 1 oothecae on herbaceous plant, Victoria (47.3205°N/27.5558°E), 04.2019, observed by Adriana Postolache; Maramureș county: 1 ootheca on an oak sapling, Baia Mare (47.6604°N/23.5837°E), 1.05.2020, observed by Marian Katler; 1 ootheca on metal sheet, Baia Sprie (47.6648°N/23.6748°E), 04.03.2020, observed by Marian Katler; 1 ootheca on house wall, Baia Sprie (47.6585°N/23.6812°E), 05.03.2020, observed by Marian Katler; 1 ootheca on *Ribes rubrum* L. stem, Băița (47.6938°N/23.4851°E), 05.03.2020, observed by Csilla Martinez-Bunda; Satu Mare county: 1 ootheca on shrub, Tătărești (47.6946°N/22.9793°E), 15.11.2020, observed by Emanuel Enghis; Timiș county: 1 ootheca on herbaceous plant, Dudeștii Noi (45.8347°N/21.0998°E), 10.10.2020, leg. Ștefan Popa; 1 ootheca on stone wall, Jdioara (45.6283°N/22.1182°E), 17.02.2020, leg. Ionela Rădac; 1 ootheca on herbaceous plant, Timișoara (45.7275°N/21.2194°), 07.04.2019, observed by Al Kaddah Yasser; Tulcea county: 1 ootheca on stone, Cerna (45.0806°N/28.3262°E), 17.03.2019, observed by Alexandru-Mihai Pintilioaie; 2 oothecae on stone, Topolog (44.8848°N/28.3226°E), 17.03.2020, observed by Cătălin Răzvan Stanciu); Vâlcea county: 1 ootheca on herbaceous plant, Costești (45.1503°N/24.0666°E), 19.09.2019, observed by Silviu Țicu.

Data on reared specimens (from dead adults, hatched and un-hatched oothecae) are shown in Table 1. Data regarding the general orientation of the oothecae (observed in 2019), height from the ground and type of substrate on which they were laid can be seen in Table 2.

Discussion

Distribution in Romania and Europe

The natural range of *Hierodula tenuidentata* includes the Caucasus region (Romanowski et al. 2019), and the first record from Europe (Crimea) came from Werner (1916). However, the species was not recorded again from Europe until very recently, when it was rediscovered in Crimea (where the species is now widespread throughout the entire Crimean coast) (Pushkar and Kayurna 2016). Other studies also recorded this species in Albania (van der Heyden 2018), Italy (Battiston et al. 2018), Bulgaria and Greece (Romanowski et al. 2019) and Ukraine (Pushkar and Kayurna 2016; Romanowski et al. 2019). Given its recent expansion in Europe along the northern part of the Black Sea coast and the Mediterranean basin and in the context of climate changes, the presence of *Hierodula tenuidentata* was somehow expected sooner or later in the southern part of Romania, due to the suitable climatic conditions. The majority of the recorded specimens were found within cities, in anthropogenic habitats, similar to those previously reported in other European countries (Pushkar and Kayurna 2016; Romanowski et al. 2019; van der Heyden 2018; Battison et al. 2018). Nymphs, adults and oothecae were also recorded on the Black Sea coast near the ports but also in wild areas. Although the species is easy to spot during the late summer and in the fall, the distribution of *Hierodula tenuidentata* is still punctiform after more than 3 years from its arrival, suggesting an aided dispersion. Based on the available data, we think that the arrival of the species in Romania could been made from 3 different sources: deliberate releases, accidental introduction from Central Europe or South Europe, or by boats on the sea for the populations from the Black Sea coast and from South-East (Fig. 1). The boat hypothesis is also supported by a specimen of *Hierodula tenuidentata* that was observed on a ship on the Black Sea, a few years ago (Moulin 2020). The praying mantises become popular among insect

Table 1. Species reared from the adult specimens and oothecae of *Hierodula tenuidentata*

Host	Order	Family	Species	Nr. of specimens
Hierodula dead adults	Diptera	Anthomyiidae	*Anthomyia* sp.	18
	Diptera	Anthomyiidae	*Anthomyia liturata* group	1
	Diptera	Fanniidae	*Fannia cf. canicularis* (Linnaeus, 1761)	2
un-hatched oothecae of *Hierodula*	Hymenoptera	Encyrtidae	unidentified	1
hatched oothecae of *Hierodula*	Coleoptera	Melyridae	*Dasytes* sp.	1 adult, 4 larvae
	Coleoptera	Dermestidae	*Anthrenus* sp.	1 adult
	Psocoptera	Ectopsocidae	*Ectopsocus* sp.	1
	Psocoptera	Liposcelididae	*Liposcelis* sp.	20
	Polyxenida	Polyxenidae	*Polyxenus lagurus* (Linnaeus, 1758)	3
	Oribatida	unidentified	unidentified	many

Table 2. The substrate, orientation and height from the ground of oothecae of *Hierodula tenuidentata* recorded in Timișoara (135 oothecae)

Substrate		**Orientation of oothecae**		**Height from the ground**	
Plant species	Number of oothecae	Orientation	Number of oothecae	Height (cm)	Number of oothecae
Platanus sp.	54	N	3	1–100	18
Ulmus montana var. *pendula*	30	E	2	101–200	46
Aesculus hippocastanum	27	SE	11	201–300	45
Acer sp.	6	S	73	301–400	13
Robinia pseudoacacia	6	SW	34	401–500	8
Tilia platyphyllos	5	W	12	501–600	5
Juglans nigra	3	**Type of substrate**		**Oothecae laying year**	
Styphnolobium japonicum	2	tree trunk	84	2018	18
unidentified shrub	2	twigs	51	2019	117

breeders and some specimens can escape or can be released into the wild, some of them being able to survive and reproduce, starting populations this way (Schwarz and Ehrmann 2018). Concerning the deliberate releases, we point out the population from Timișoara which is established in the parks near the Orthodox Metropolitan Cathedral and it is absent in other parks from the city. In Romanian, the praying mantises are called „călugărițe" which translates as „nuns", therefore specimens could have been introduced near the Cathedral based on the name-location relationship. But specimens from cities could originate also from oothecae laid on ornamental shrubs and trees that were imported from other countries. Moreover, the oothecae deposited on trains, cars, plant materials or different cargo pieces, can travel many kilometers and hatch in a suitable place in another country or continent (Schwarz and Ehrmann 2018). A natural expansion, probably accelerated by humans, from the Black Sea coast (Ukraine and/or Bulgaria) to Romania is also possible, but in this case we should have seen a more compact distribution rather than punctiform. Moreover, as the species was found only one time in Crimea in 1916 and rediscovered 100 years later, it is hard to believe that the species was present there all this time and no one noticed it until now. Also, the recent records from more countries (Pushkar and Kayurna 2016; van der Heyden 2018; Battiston et al. 2018; Romanowski et al. 2019) registered only in a couple of years, cannot be explained other than by human introduction. Taking all these aspects into consideration, we think that current distribution of the species in Europe is the result of repeated introductions (deliberated or not) from where it is spread naturally, but only some genetic studies could reveal the true origin of European populations of *Hierodula tenuidentata*.

Identification of adults and oothecae

Considering the recent discussions about the synonymy of *Hierodula transcaucasica* with *Hierodula tenuidentata* (Ehrmann 2011; Battiston et al. 2018) we regarded all our specimens as *H. tenuidentata*. In Romania, the species can be superficially confused only with *Mantis religiosa* (Linnaeus, 1758) and *Iris oratoria* (Linnaeus, 1758). *Mantis religiosa* and *Iris oratoria* have the stigma of the same color as the tegminae. Also, in *Mantis religiosa* the inner side of the fore coxae have a conspicuous dark or white ringed dark spot, which lacks in all the other species of Mantidae from Romania; in *Iris oratoria* the frontal sclerite has two tubercles (not present in *Hierodula tenuidentata*, but both species have two small tubercles between the eye and base of the antenna (Figs 2 B, C) and the hind wings present two big darkish spots. The pronotum of *Hierodula tenuidentata* is shorter, with expanded edges, it has an ovoidal general shape, and the stigma color is whitish (Fig. 3). Not only *Hierodula tenuidentata* was recently recorded from a few European countries, two other similar allochthonous mantis species have been reported as well: *Sphodromantis viridis* Forsskål, 1775 (Schwarz and Ehrmann 2018, Battiston et al. 2020b) and *Hierodula patellifera* Serville, 1839 (Moulin 2020; Battiston et al. 2020a). *H. pattelifera* has bigger, conspicuous whitish plates at the base of the spines of inner margins of fore coxae, while *H.*

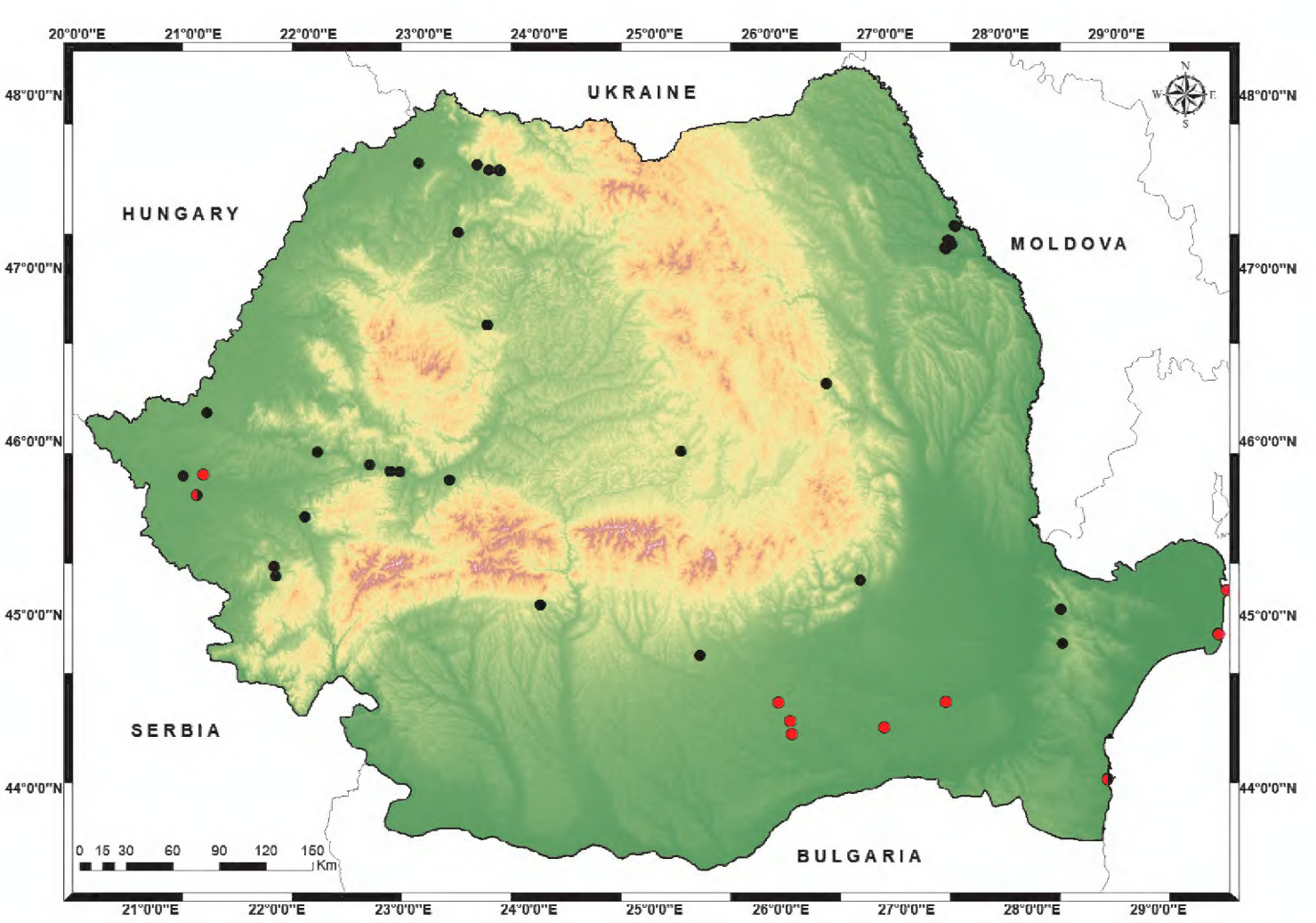

Figure 1. Distribution of praying mantis recorded in Romania by this paper: red circles - *Hierodula tenuidentata* (adults and oothecae), black circles - *Mantis religiosa* (oothecae), bicolor circles - both species co-occurring.

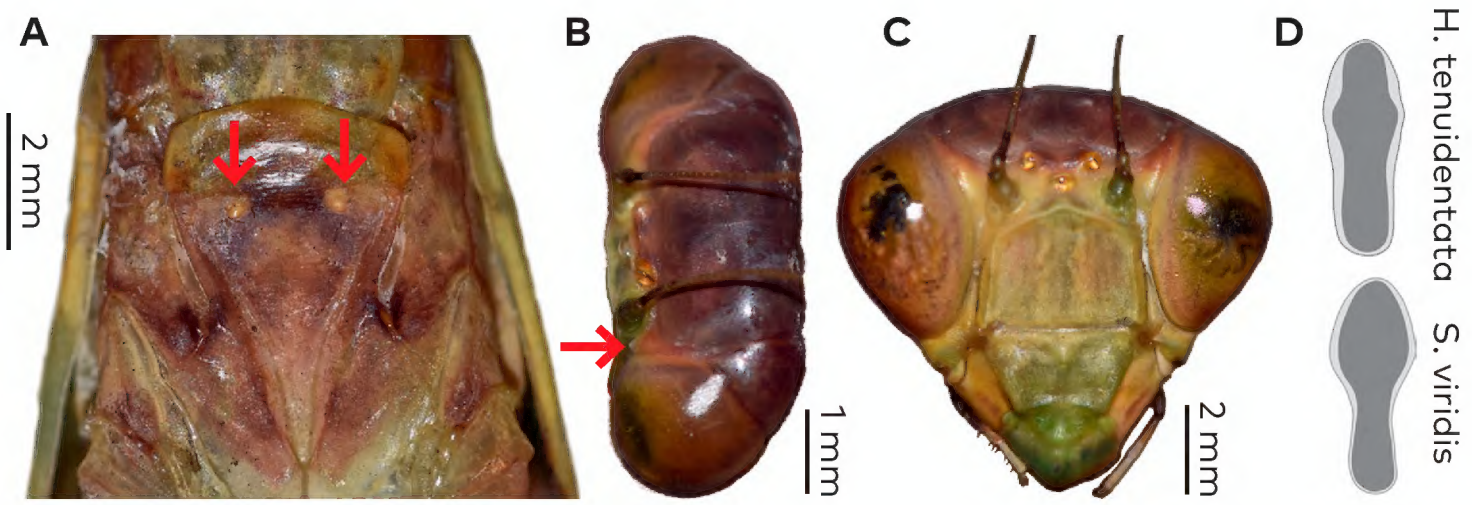

Figure 2. Morphological details of *Hierodula tenuidentata* used for species discrimination. **A** mesosternum of *H. tenuidentata*, with red arrows indicating the 2 small tubercles **B** head (dorsal view) of *H. tenuidentata*, with red arrow indicating small tubercle between the eye and base of the antenna **C** head (frontal view) of *H. tenuidentata* **D** schematic representation of pronotum (dorsal view) of *Hierodula* and *Sphodromantis*.

tenuidentata has smaller, less evident whitish plates. Differences between *Hierodula* and *Sphrodomantis* can be seen in the shape of pronotum (ovoidal in *Hierodula* and spatulate in *Sphodromantis*) (Fig. 2 D) and the presence of two small tubercles on the mesosternum in *Hierodula*, which are absent in *Sphodromantis* (Fig. 2 A).

The oothecae are easy to spot especially in the colder season, when the vegetation is less developed, and this can add valuable data to the distribution of the species, given the fact that in praying mantises the oothecae have a great taxonomic potential (Brannoch et al. 2017) Herein we present the differences between the oothecae of *Hierodula tenuidentata* and the most common mantis species in Romania, *Mantis religiosa* (Fig. 3). The *H. tenuidentata* oothecae is variable in size, our specimens are between one and three cm in length and the shape is more rounded, with proximal and distal edges almost straight in lateral view. The residual process is situated in the upper part of the distal end, the color of the ootheca is dark brown with the emergence area whitish after laying but turning dirty yellow in time. In *M. religiosa*, the oothecae has an overall ovoidal shape with proximal and distal edges obliques, the residual process is situated in the bottom part of oothecae, the color of the ootheca is light brown after laying turning brown in time, the emergence area has the same color with the rest of ootheca or is slightly lighter.

About half (54%) of the *H. tenuidentata* oothecae were positioned on the south side of the trees, 33% on the south east and south west and 13% on the west, north and east sides of the trees. This can be probably explained by the species preferences for a warmer climate, the oothecae more exposed to the sun having more chances to hatch. The species probably prefers a smoother substrate for ootheca laying, since 40% of the oothecae were found on the bark of *Platanus* sp. Another more probable explanation is the high albedo of the *Platanus* bark, so the mantids were more likely to be visually attracted by this type of tree for laying their ootheca, since a high albedo

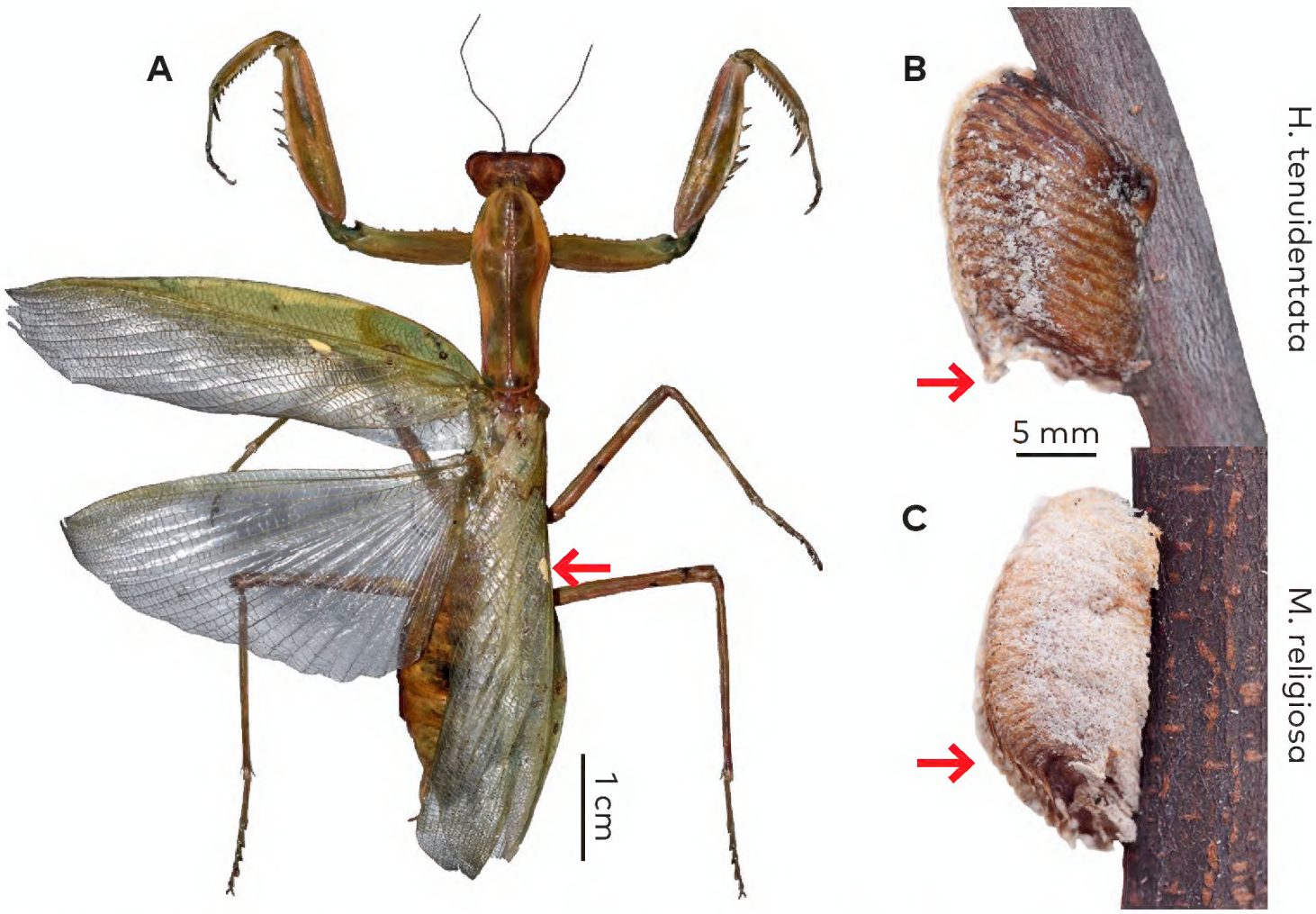

Figure 3. Adult female of *Hierodula tenuidentata* and ootheca of *Hierodula tenuidentata* and *Mantis religiosa* from Romania. **A** habitus of *Hierodula tenuidentata* (dorsal view), with red arrow indicating the whitish stigma **B** ootheca (lateral view) of *Hierodula tenuidentata*, with red arrow indicating the residual process **C** ootheca (lateral view) of *Mantis religiosa*, with red arrow indicating the residual process.

can suggest a sensation of sunny, warmer place (Long et al. 2011). The preference of *Platanus* as substrate is also supported by the fact that plane trees are not a dominant species in the area but almost all specimens from this species had at least one ootheca laid on it. The vast majority (87%) of oothecae were found on more than one meter above the ground, 66% from all of them being situated between one and three meters above the ground. Also, 38% of them were found on twigs and 62% on tree trunks. Those data can be explained by the arboreal behavior of the species (Battison et al. 2018) and also by a decrease in their detection with the increase of height (as it can be seen in Table 2).

Interactions with native fauna

The insects reared from the dead *Hierodula tenuidentata* adults belong to the Diptera order, no parasitoids were found. *Anthomyia* sp., *Anthomyia liturata* group and *Fannia* cf. *canicularis* are probably opportunistic species, the larvae being able to develop in all kind of organic matter (Rozkošný et al. 1997; Suwa and Darvas 1998), so it is not unexpected that we reared those flies from this mantis species.

From the un-hatched oothecae we obtained only one parasitoid specimen, a member of Encyrtidae family, which are known as parasitoids or hyperparasitoids of a large group of insects, but not on Mantodea (Gibson 1993). Thus, this parasitoid is either reared from an overlooked coccoidea which was seated on the bark near ootheca, or reared from an unknown insect that was hiding within the air-layer of an ootheca. We also obtained *Hierodula tenuidentata* nymphs from 10 oothecae. Usually the number of hatched specimens is small in the first hours, but the majority of them appear after 1 or 2 days. In cases of supra agglomeration, we observed cannibalistic behavior in some of the freshly hatched nymphs. The presence of a big number of oothecae (both un-hatched and hatched ones), the successfully hatching of a big number of nymphs, the finding of nymphs in the field and of adults in the same place in two consecutive years represent a very strong evidence of a stable population of *Hierodula tenuidentata* in Romania.

From the hatched oothecae we reared at least 6 different species (*Anthrenus* sp., *Dasytes* sp., *Ectopsocus* sp., *Liposcelis* sp., *Polyxenus lagurus* and unidentified Oribatida specimens), from 4 different orders (Coleoptera, Psocoptera, Polyxenida and Oribatida). The hatched oothecae represent shelter (especially during winter) and food sources for a various number of opportunistic arthropods, so the number of species that can be found in the hatched oothecae of *Hierodula tenuidentata* will certainly grow with future studies.

The impact of this allochtonous species on the indigenous fauna is currently very poorly understood. It is believed that the reproduction of *Hierodula* may interfere with the reproduction of native mantidae species, given the fact that the widespread European mantis (*Mantis religiosa*) can be attracted by the pheromones of phylogenetically distant species (Lelito and Brown 2008). Furthermore, there is a possibility of *M. religiosa* being predated by *H. tenuidentata*, although the last tends to be more arboreal than the former (Battison et al. 2018; Romanowski et al. 2019).

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